Information interoperability evaluation model for public web sites

J. A. Martinez Usero[a], P. Beltrán Orenes[a], J. A. Martínez Comeche[a] and R. San Segundo Manuel[b]
[a] *Department of Library and Information Science, Complutense University of Madrid. C/ Santísima Trinidad, 37, 28010 Madrid, SPAIN*
[b] *Department of Library and Information Science, Carlos III University. C/Madrid 129, 28903, Getafe , SPAIN*

The research project is based on the recently adopted European Interoperability Framework and its Spanish equivalent in order to design an evaluation model to identify key aspects related to information and knowledge interoperability in public organizations. The main objective of the project is oriented to diffuse the information interoperability standards in public organizations and to foster the usage of new techniques and procedures for information integration and management. The method used to carry out the research consists of three main phases: the analysis of information interoperability related technologies, the design of a model to evaluate information interoperability in public web sites, and the empirical analysis of key factors affecting information interoperability. The project main result is an electronic tutorial to facilitate the information and knowledge evaluation process in public organizations and to plan the conversion from non-interoperable technologies and formats to interoperable ones.

Keywords: Information interoperability, Public web sites, e-Government, Evaluation.

1 INTRODUCTION

Information interoperability is the capacity of different information systems, applications and services to communicate, share and interchange data, information and knowledge in an effective and precise way, as well as to integrate with other systems, applications and services in order to deliver new electronic products and services.

The research project is based on the pillars of the recently adopted European Interoperability Framework (2005) [1]and its Spanish equivalent (2004) [2], and it is oriented to configurate an evaluation method of key factors related to information and knowledge interoperability. Having into account the good practises in the field of information interoperability in public government, a model to evaluate the web resources of public organisations will be developed and the conversion tasks form non-interoperable technologies to interoperable technologies will be defined.

2 MATERIAL AND METHODS

The method used to carry out the research consists of three main phases: the analysis of information interoperability related technologies, the design of a model to evaluate information interoperability in public web sites, and the empirical analysis of key factors affecting information interoperability.

Firstly, technologies related to information and knowledge management in public web sites are analysed to detect the existing connections with information interoperability [3]. The analysis is carried out through a revision of law, standards and guidelines included in different interoperability frameworks. The analysis results in the identification of eight main information interoperability related technologies, namely: mark-up languages, open software and open formats, electronic records and documents management, web accessibility guidelines, classification systems, metadata, and information retrieval systems .

Secondly, a model to evaluate objective indicators for the formerly mentioned information interoperability related technologies has been developed. The interoperability indicators have been selected by a consultation process in which some relevant Spanish experts have sent their proposals. Then, the indicators have been contrasted and accepted or non-accepted by the rest of the consultation panel.

Thirdly, the selected interoperability indicators are analysed in a representative sample of a web site resources. Finally the results are processed, and a report with the main detected errors and some conversion

proposals or good practices is generated [4].

3 RESULTS

The research project implies an important advance in the field of information interoperability of e-government services, and it will benefit to different level public organizations and departments, as they can use a model and a tutorial as a useful tool to plan or evaluate the interoperability of a web service or product.

The main results are a model to evaluate information interoperability according to the guidelines included in the European and Spanish interoperability frameworks, and a tutorial for public managers that will help them to acquire a knowledge base on interoperability technologies. Therefore, this new knowledge base will improve the adaptation of public web services and products to the new technological requirements, new standards and new formats [5].

4 DISCUSSION

The proposed model to evaluate information interoperability by seven main sections each one containing a set of evaluation indicators.

In order to evaluate **mark-up languages**, there are some relevant indicartors most of them included in the W3C Technical Reports and that can be summarized in the following ones [6]:

- The existence of a doctype declaraion at the beginning of an HTML document, that generally is expressed as follows: <!doctype HTML public "-//W3C//DTD HTML 4.0//EN" "http://www.w3.org/TR/REC-html40/strict.dtd">.

- The usage of the most recent version of mark-up language (HTML, XML o XHTML) so they only include valid elements and ommit deprecated ones. For example, the last version for HTML is 4.01 and for XHTML is 1.1.

- Closely linked to the former indicator is the usage of deprecated elements, that are supported by most browsers, but the quality and interoperability of a website is enhanced when only valid elements are used. A list of deprecated elements can be found in http://www.w3.org/TR/html4/index/elements.html.

- Another evaluation indicator for the mark-up languages section is the correct application and usage of CCS, separating structure (in HTML) and presentation (in CSS).

The evaluation of **open software and open formats** can be difficult. Some objective indicators that are included in the model are [7]:

- The usage of open software for database connection, for example php, (but not asp which is a propietary method).

- The publication of non HTML documents in open formats, such as: OpenOffice.org (OOo) or OpenDocument Format, (ODF).

For the correct management and publication of **electronic records and documents** the following evaluation indicators are considered relevant [8] [9]:

- Text format documents should be in any of the following extensions, considered interoperable in the Spanish interoperability framework: txt, rtf, sxw, odf, o pdf.

- Graphic documents should be published in any fo the following formats: jpeg, tiff, png o fax.

- Vectorial formats should be CGM or VML.
- Multimedia formats could be exported to SMIL.

In order to evaluate the **accessibility of web resources** the principles and recommendations included in the Web Content Accessibility Guidelines 1.0 (WCAG) have been taken into consideration. The WCAG is structured in 14 main guidelines and 3 priorities of importance. Moreover, there is a list of checkpoints classified by priority. Each checkpoint has been considered as an evaluation indicator for our interoperability evaluation method.

For **classification and navigation systems**, some relevant indicators included in the model are [10]:

- The website contains a structured web map.
- The website includes one or several navigation bar and they are consistent across the website.
- The number of items of each navigation bar is less than 10.
- The navigation bars have been codified using OL or UL elements and CSS.
- The classification systems used are correct and they do not mix different classification methods.

Metadata are a way to represent knowledge in web resources [11] and some examples of objective indicators of metatata aplication in the context of the interoperability evaluation model are:

- The metadata are included in the head of a HTML document and they are grammatically correct.
- The metadata set contains a representative title of the web resource.
- The main metadata elements for semantic information are included, namely: title, keywords and description [12].

The information retrieval system of a website is oriented to make easier the localization of information that a user is seeking and it is a complement to the navigation systems of the website [13]. Some relevant evaluation criteria for a information retrieval system in the context of a website are:

- The existence of an interal search engine accessible form all pages and that indexes all internal resource of the website.
- The search engine interface should include different searh options, for example: simple and advanced search, search refinement, etc.
- The search engine should have a series of help documents, faqs or other tools to assist the user in the searh process.

5 CONCLUSION

As the European and Spanish interoperability frameworks have been recently approved, the project has a competitive advantage, as it will develop the first tool avaliable in the market to evaluate information interoperability in e-government services and to elaborate an action plan for conversion, modifications and migrations.

The project can potencially benefits to all public government organizations of different administrative level (national, regional, local, etc.). Moreover, it offers and added value as it includes a set of guidelines related to specific conditions of web contents for disabled users.

REFERENCES

[1] SEC (2003) 801. *Commission Staff Workking Paper: linking up Europe, the importance of interoperability for e-government services*. <http://europa.eu.int/ISPO/ida/export/files/en/1523.pdf>.
[2] Ministerio de Administraciones Públicas. *Aplicaciones utilizadas para el ejercicio de potestades. Criterios de Seguridad, Normalización y Conservación: Versión 2.2 de 24 de junio de 2004.*. <http://www.csi.map.es/csi/criterios/index.html>.
[3] Seligman, Len, Rosenthal, Arnon. 2004. A framework for information interoperability. *The Edge. MITRE's advanced technology newsletter*, 8 (1).
[4] Abdalla, Khaled F. A model for semantic interoperability using XML. *Proceedings of the 2003 systems and information engineering design symposium*, IEEE, 2003, pp. 107-11.
[5] Klischewski, R. Information integration or process integration? How to achieve interoperability in administration. *Proceedings of EGOV 2004*, Berlin: Springer, 2004, pp. 57-65.
[6]
[7] Martínez Usero, José Angel. La necesidad de interoperabilidad de la información en los servicios de administración electrónica: xml, una posible solución. *Tecnimap 2004. VIII Jornadas sobre tecnologías de la información para la modernización de las Administraciones Públicas: e-Cooperación en la Administración Pública*, Murcia.
[8] *OpenOffice.org1.1.4*. <http://www.openoffice.org/>.
[9] BERENDSEN, Veiko. 2001. From GOST to ISO: continuity and change in document and records management standards. *Baltic IT&T review*, 22 (3).
[10] Todd, Malcolm; Harries, Stephen. Functional requirements for ERMS. *Proceedings of the DLM-Forum 2002*. Barcelona, 6-8 May 2002.
[11] Rosenfeld, Louis, Morville, Peter. *Information architecture for the World Wide Web: designing large-scale web sites.* O'Reill, 2002.
[12] San Segundo Manuel, Rosa. Organización del conocimiento en Internet: metadatos bibliotecarios Dublin Core. *Fesabid 98. VI jornadas españolas de documentación. Los sistemas de información al servicio de la sociedad*. Valencia: Fesabid, 1998.
[13] Martínez Usero, José Angel. 2006. El uso de metadatos para mejorar la interoperabilidad del conocimiento en los servicios de administración electrónica". *El profesional de la información*, 15 (2), pp. 114 -126.
[14] Lara Navarra, Pablo; Martínez Usero, Jose Angel. Agentes inteligentes para la búsqueda y recuperación de información. Barcelona: UOC, 2004.